

Biotechnology and Personalized Medicine: Biotechnology innovations enable personalized medicine approaches tailored to individuals' genetic makeup, lifestyle factors, and medical histories. Precision medicine utilizes genetic sequencing, biomarker analysis, and computational modeling to optimize diagnoses, treatments, and preventive strategies for various diseases, including cancer, cardiovascular disorders, and genetic disorders. Integrating big data analytics and artificial intelligence algorithms enhances healthcare decision-making processes, enabling clinicians to deliver targeted interventions with greater efficacy and reduced adverse effects. Ethical considerations surrounding patient privacy, data security, and equitable access to personalized healthcare services underscore the importance of ethical guidelines and regulatory frameworks in advancing biotechnological innovations for public health benefit.